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(54) Charging portable telephone batteries

(57) A main body 11 of a battery charger may accommodate a battery O as a power source, and a voltage dropping/booster DC/DC converter circuit (21,22,23, Figs.2,11) which changes the voltage of the source battery O to provide an output voltage suitable for charging a battery pack B for a portable telephone. The source battery O may be formed by dry cells or secondary cells. Means may be provided so that the charger can additionally be powered from a mains AC supply, or from a battery in a car. An audio or visual alarm may be provided to warn that the battery B has been connected with the wrong polarity. A manual switch 13 or an automatically operated switch (24,25) may be provided for changing the output polarity. Flexible output terminals 3 of the charger may be adjustably positioned to suit different types of battery, or terminal attachments to suit different types of battery may be provided and substituted as needed. The terminals 3 may be adjustably mounted on a cover 12 of the charger, the cover 12 being removed from the main body 11 of the charger for coupling to the battery B. The terminals 3 may alternatively be mounted at the ends of respective wires (Figs.8-10). Permanent magnets 14, double sided adhesive tape, an elastic belt, or a flexible member with a crimp fastener may be used to hold the terminals 3 in contact with the battery B. In addition, a DC output jack (33, Fig. 11) may be provided so that a portable telephone can be connected to the charger via a charging cord for in-situ charging of the battery within the phone.

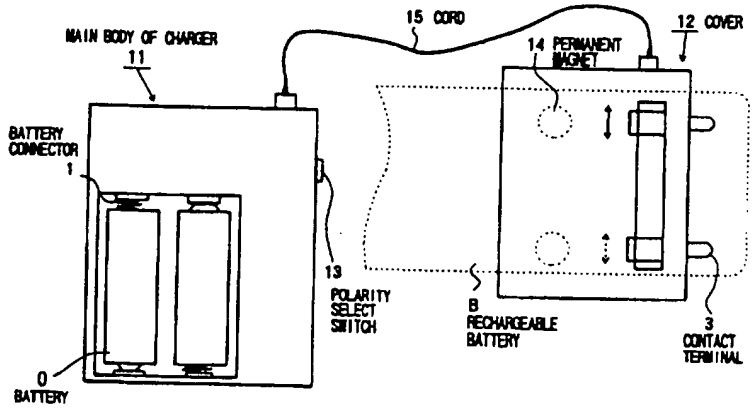

FIG. 7

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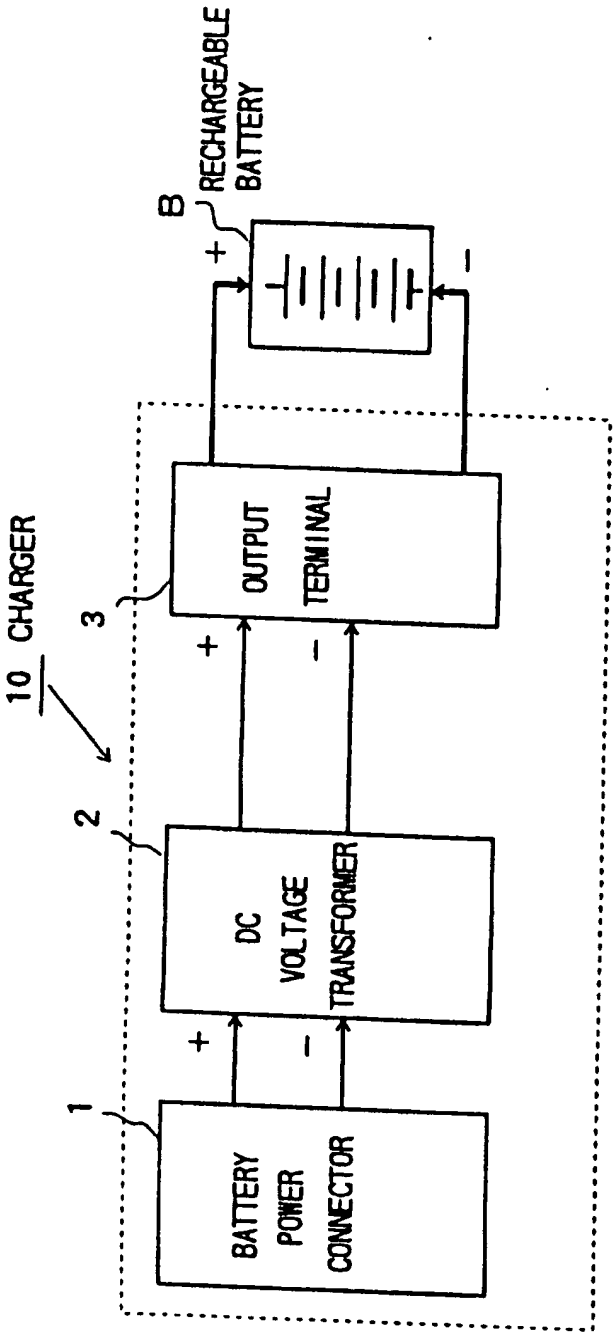
B
RECHARGEABLE BATTERY
+
-
10 CHARGER
3
OUTPUT TERMINAL
+
-
2
DC VOLTAGE TRANSFORMER
+
-
1
BATTERY POWER CONNECTOR

FIG. 1

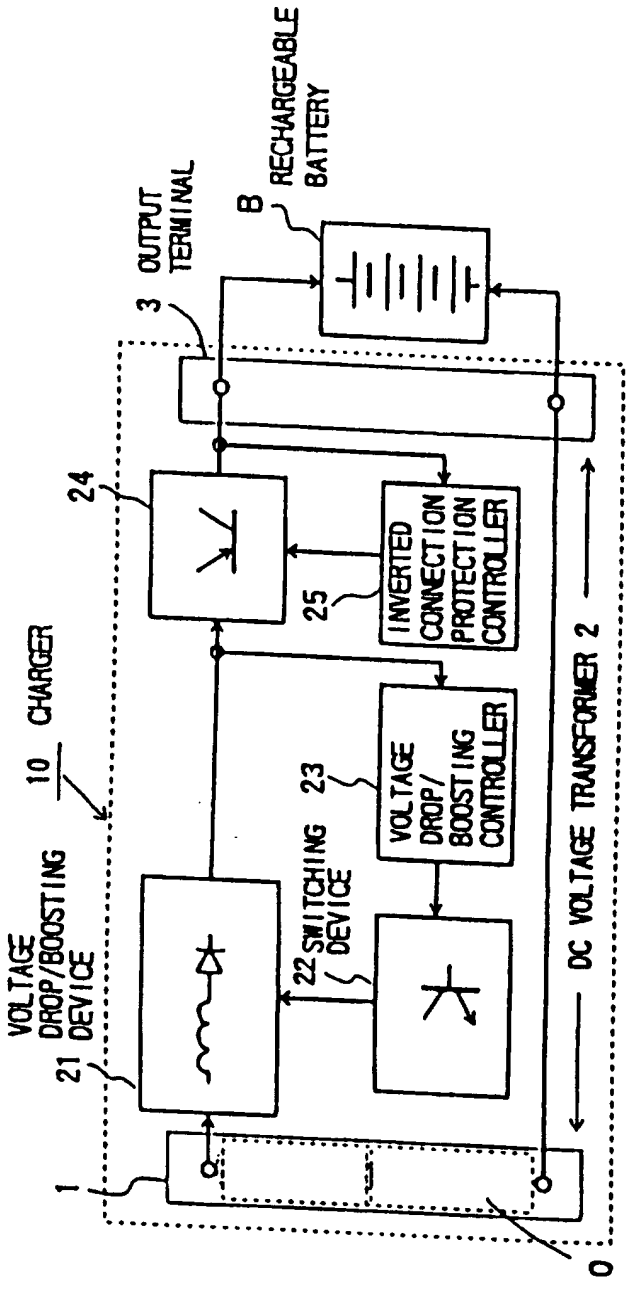
RECHARGEABLE BATTERY
B
OUTPUT TERMINAL
3
24
INVERTED CONNECTION PROTECTION CONTROLLER
25
VOLTAGE DROP/ BOOSTING CONTROLLER
23
SWITCHING DEVICE
22
VOLTAGE DROP/BOOSTING DEVICE
21
CHARGER
10
DC VOLTAGE TRANSFORMER 2
1
0
BATTERY

FIG. 2

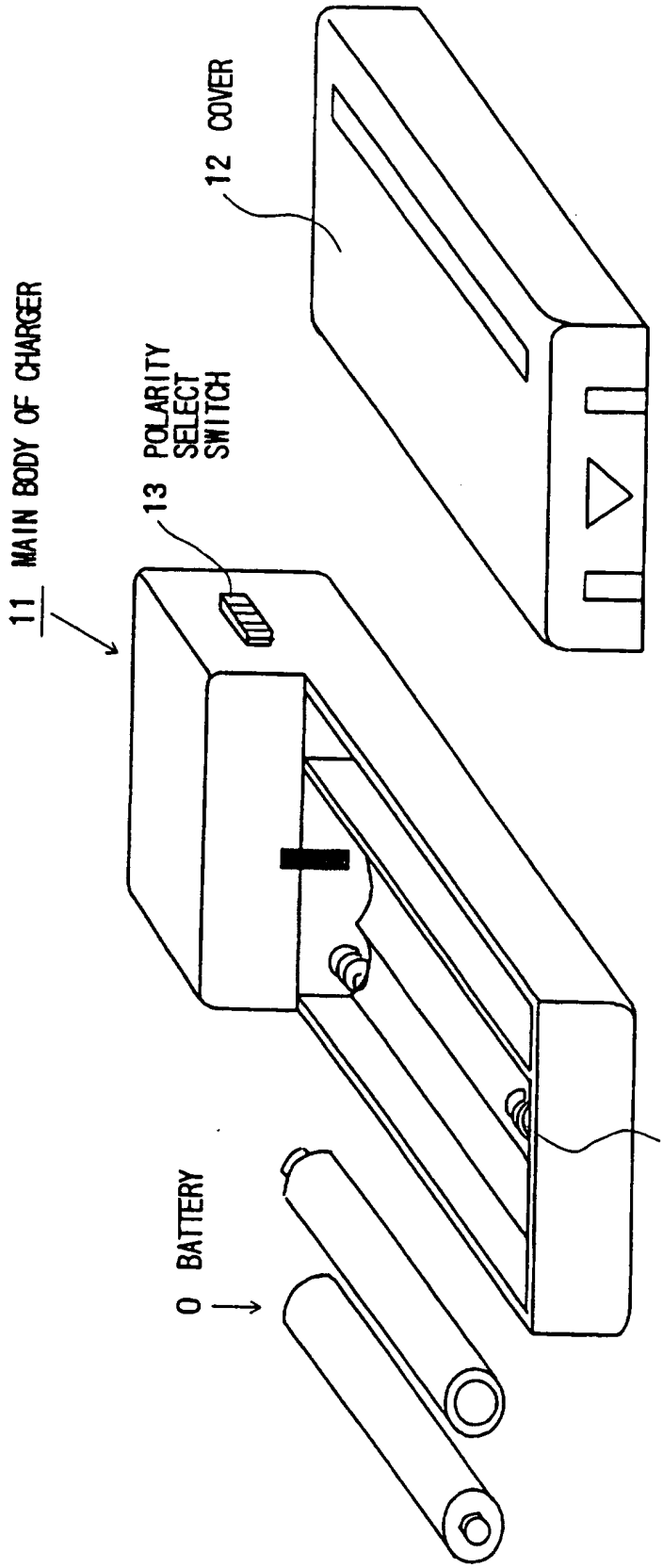
12 COVER
11 MAIN BODY OF CHARGER
13 POLARITY SELECT SWITCH
1 BATTERY CONNECTOR
0 BATTERY

FIG. 3

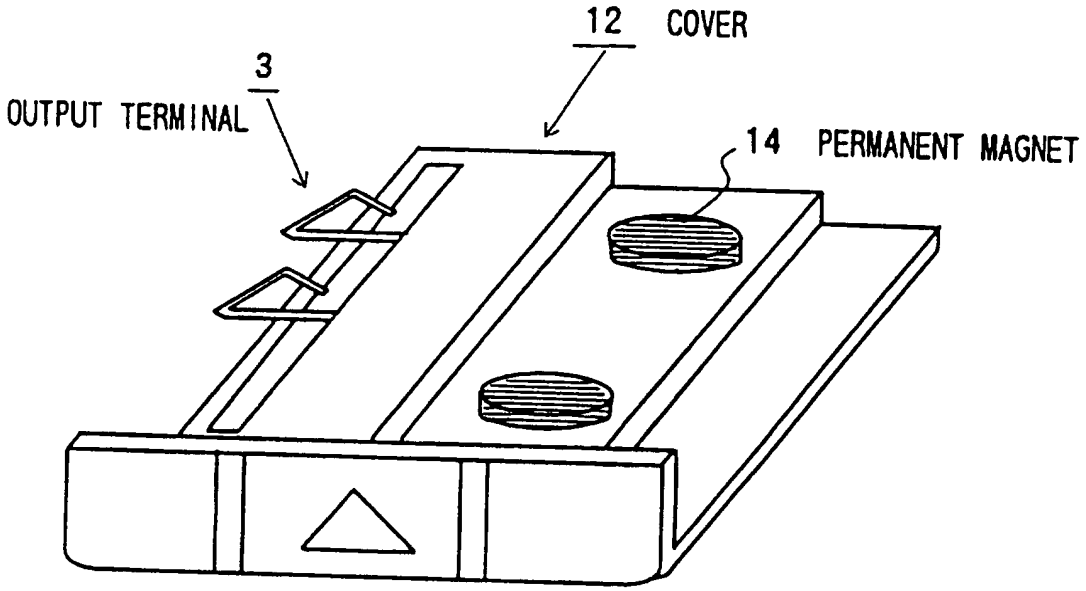

FIG. 4

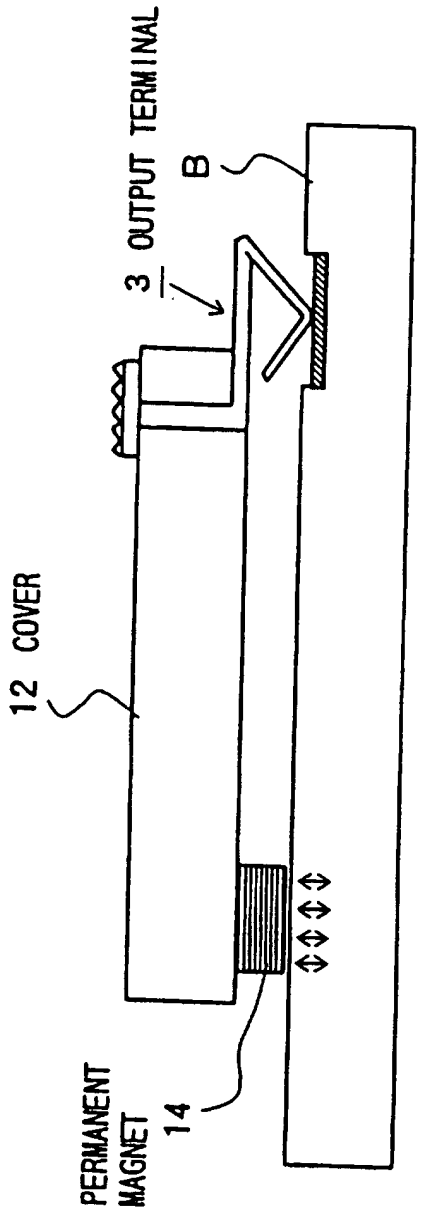

FIG. 5

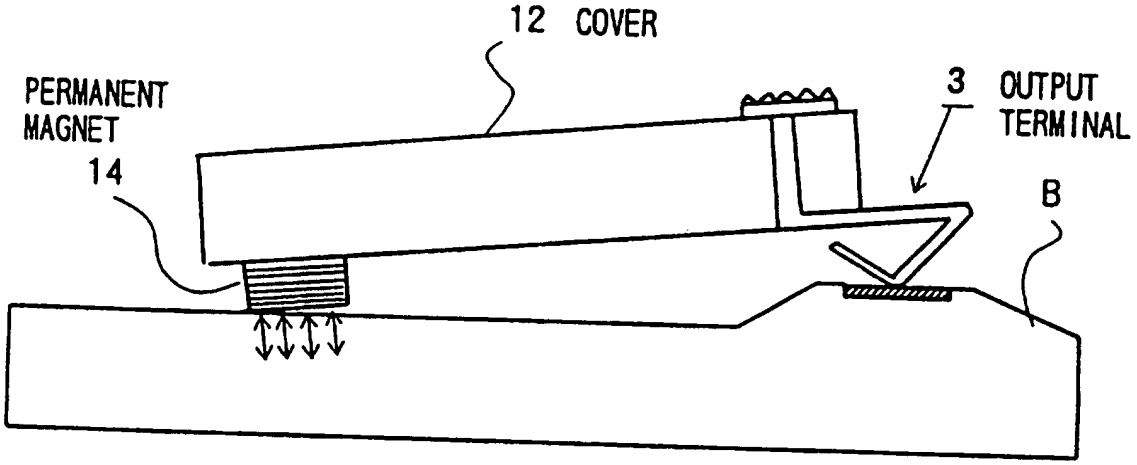

FIG. 6

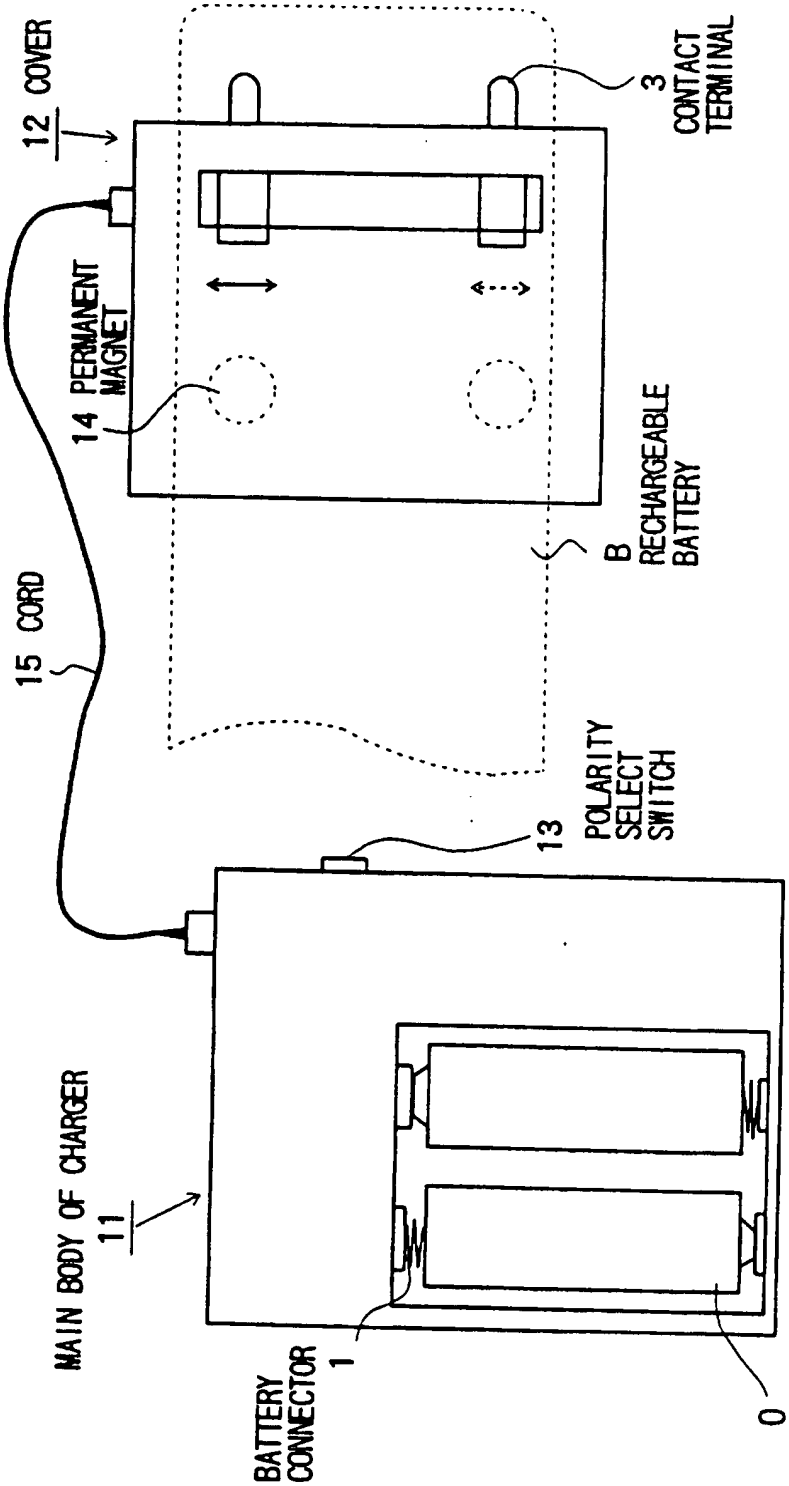
12 COVER
3 CONTACT TERMINAL
14 PERMANENT MAGNET
B RECHARGEABLE BATTERY
15 CORD
13 POLARITY SELECT SWITCH
MAIN BODY OF CHARGER 11
BATTERY CONNECTOR 1
0 BATTERY

FIG. 7

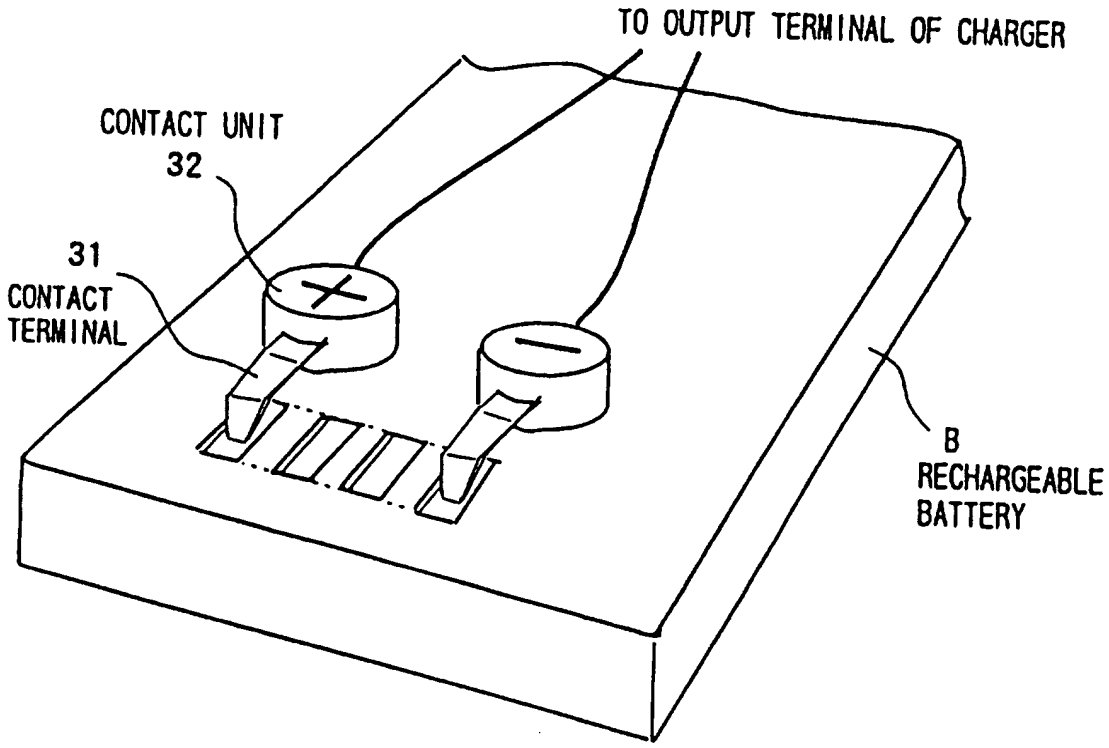
TO OUTPUT TERMINAL OF CHARGER
CONTACT UNIT
32
31
CONTACT
TERMINAL
B
RECHARGEABLE
BATTERY

FIG. 8

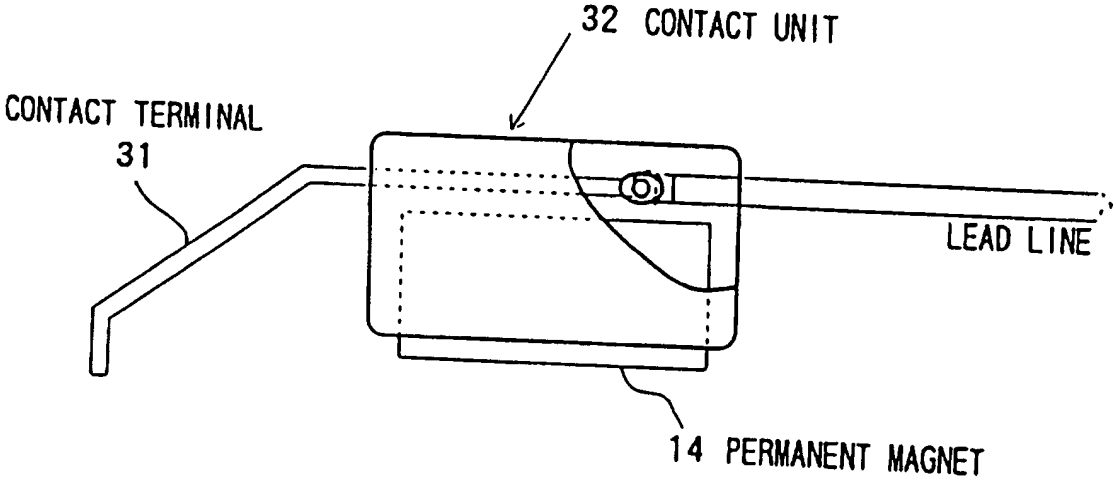
32 CONTACT UNIT
CONTACT TERMINAL
31
LEAD LINE
14 PERMANENT MAGNET

FIG. 9

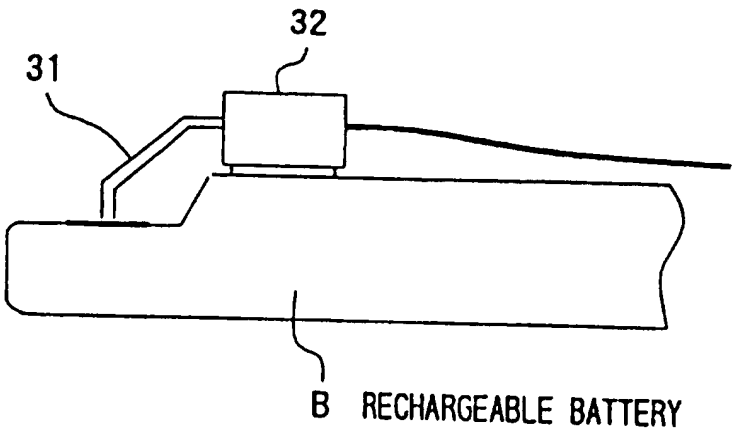

FIG. 10A

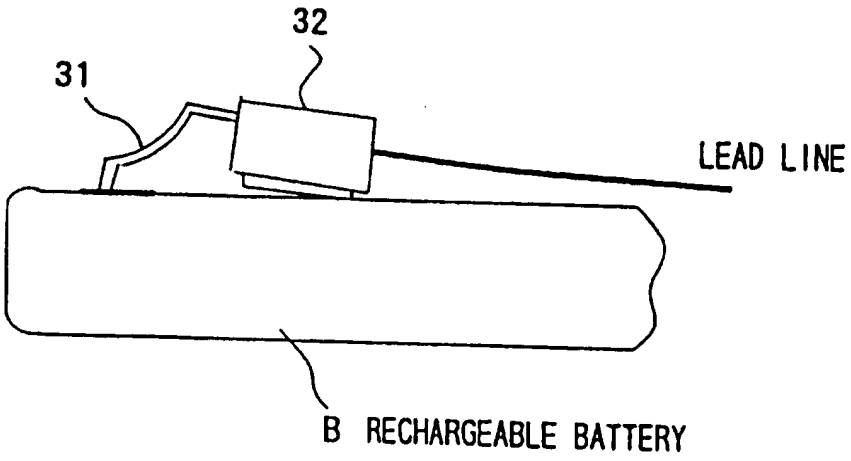

FIG. 10B

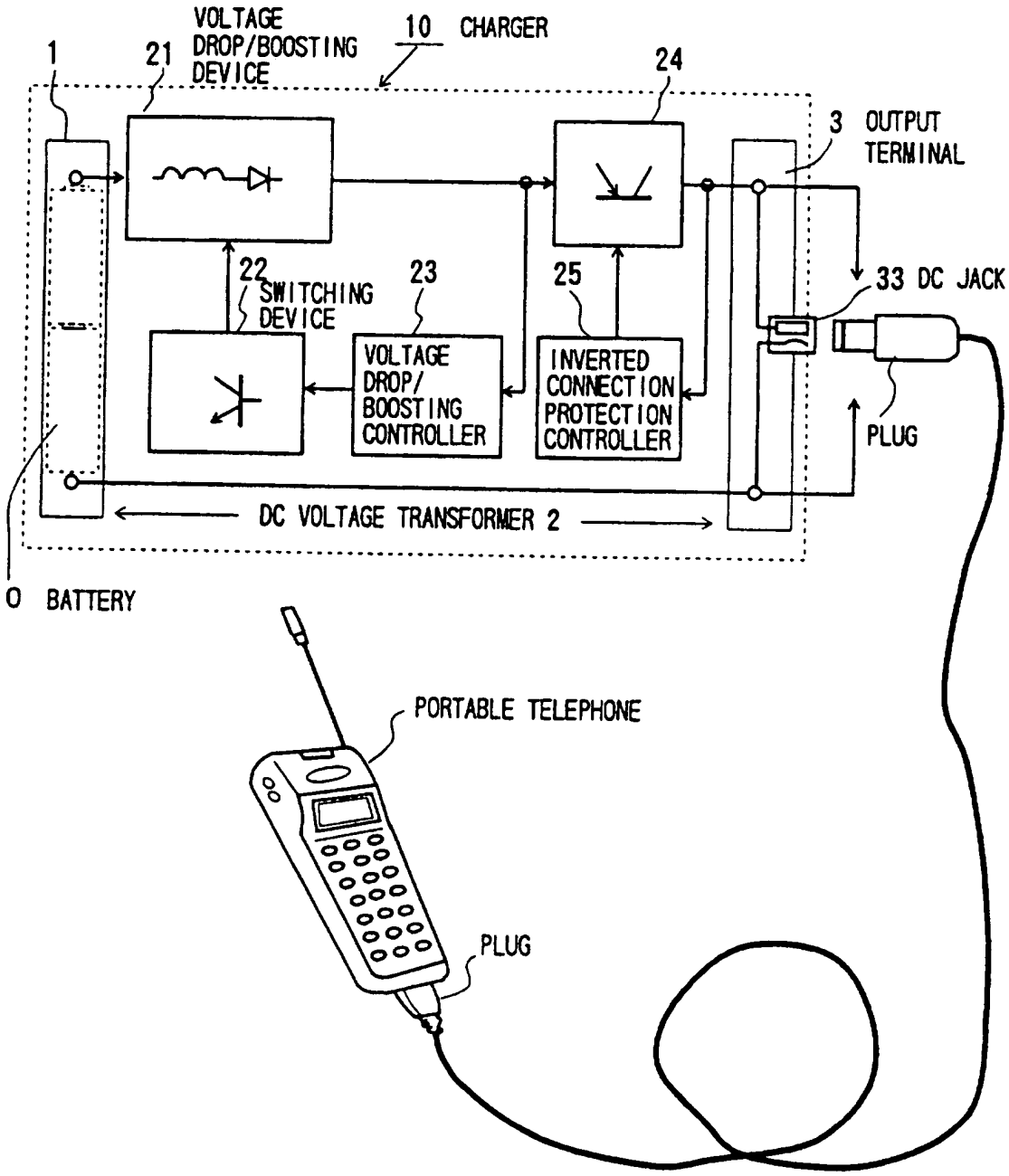
VOLTAGE DROP/BOOSTING DEVICE
10 CHARGER
1
21
24
3 OUTPUT TERMINAL
22 SWITCHING DEVICE
23
25
33 DC JACK
VOLTAGE DROP/ BOOSTING CONTROLLER
INVERTED CONNECTION PROTECTION CONTROLLER
PLUG
DC VOLTAGE TRANSFORMER 2
0 BATTERY
PORTABLE TELEPHONE
PLUG

FIG. 11

2313242

Charger For Secondary Battery For Portable Telephones

The present invention relates to a charger, for a secondary battery for portable telephones, that can charge any type of portable telephone secondary battery, regardless of where it is used.

Recently, portable telephones and PHSs (hereinafter referred to simply as portable telephones) have become to be widely used, and secondary batteries have assumed extremely important roles as power sources. As is well known, there are primary batteries that can be charged only one time, and secondary batteries that can be charged and discharged many times. The widely used primary batteries, such as manganese batteries and alkali manganese batteries, are also standardized internationally, and are easy to use; but they are disposable products.

Lead-acid batteries, which have been used for a long time as secondary batteries that can be charged and discharged many times, have been improved during the long history, and their sizes and capacities are greatly enhanced. These lead-acid batteries, however, are not appropriate for use as power supplies for

compact portable devices, such as portable telephones, because they are heavy and because in them a dilute sulfuric acid solution is used as an electrolytic solution.

Small, sealed lead-acid batteries, which are provided by compactly forming the conventional, well known lead-acid batteries, are sometimes adopted, but the battery capacity per unit weight is small. At present, nickel-cadmium (Ni-Cd) batteries, nickel-metal hydride (NiMH) batteries, lithium ion (Li) batteries, etc., are commonly used as compact secondary batteries in a variety of portable devices.

Although secondary batteries for portable telephones are widely used, since portable telephones are extremely popular at the present, the sizes and shapes of the batteries differ, depending on the model, and their terminal voltages vary from 3.6 V to 9.6 V. Therefore, chargers that have connection terminal shapes suitable for individual battery types and that generate voltages higher than the terminal voltages of the batteries are required for charging secondary batteries. For this purpose, a common charger reduces a commercially available voltage to an appropriate voltage and rectifies it to obtain a DC voltage for charging the batteries.

A distinct difference between many portable devices, such as handy terminals, notebook computers

and electronic notebooks, and portable telephones is that while the time at which the former devices are activated is user selectable, portable telephones can be self-activated, i.e., they have call transmission functions, and can also be activated involuntarily by an external device, i.e., they have call reception functions. As calls from the third persons can not usually be anticipated, portable telephones must be ready (on standby) to receive calls, regardless of the time and place.

Further, as portable telephones are useful because they can be carried, and since they are carried while away from home, while traveling or on business trips, it can not be ensured that time for charging will be available when desired. Because of this property of portable telephones, to find time for charging the secondary batteries is very important. And as a result, the downtime for a portable telephone during which the secondary battery is being charged or exchanged must be as short as possible.

To cope with such a need, a plurality of batteries are prepared, and when the remaining capacity of a battery is inadequate, the battery is replaced with a spare so that it can be charged. However, since for a conventional charger a commercially available power supply is acquired, this is not useful while away from home or while traveling when there is no commercially

available power source.

In addition, when using a conventional method for charging a battery, it is not easy to terminate the charging at the time the battery is fully charged, and in many cases, even though batteries have not been fully charged, they must be used again. At the present, the charging condition of a compact secondary battery can not be confirmed externally, and it is not easy to determine when a battery has been satisfactorily charged.

It is, therefore, one object of the present invention to provide a charger, for a secondary battery used for a portable telephone, that can easily charge the secondary battery, regardless of the time and place.

A charger, for a secondary battery for a portable telephone according to the present invention, comprises a battery power connector, at which a voltage differs from a terminal voltage for a rechargeable battery that is used for a portable telephone; DC voltage transformer means, for adjusting the voltage from a power supply battery to the voltage of the rechargeable battery; and an output terminal portion, for applying a voltage output by the DC voltage transformer means to terminals of the rechargeable battery.

A power supply battery used for the charger of the

present invention can be an easily available standard dry cell battery. Such dry cell batteries are easily obtained as they are sold in electric shops, department stores, supermarkets, photo shops, grocery stores and convenience stores, and at station stalls, recreation grounds, souvenir shops, etc. Furthermore, since a multitude of dry cell battery vending machines are set up, dry cell batteries can be acquired any time.

When two dry batteries are employed, for example, the DC voltage transformer means can be constituted by a voltage boosting circuit that raises a voltage of 3 V to the voltage for a secondary battery for a portable telephone, e.g., 3.6 V to 9.6 V, and that incorporates a switching device.

Further, since many charging batteries that have the same standard sizes as have dry cell batteries are available on the market, such rechargeable batteries can also be used for the charger of the present invention. Car batteries of 12 V or 24 V can also be used as power sources for charging.

A more effective charger can be acquired by providing an additional voltage drop circuit as the DC voltage transformer means. In this case, to achieve the object of the invention, a connection cord fitted with a plug for inserting into a cigar lighter receptacle, which is mounted in a car, is additionally provided.

In addition, a commercially available power source of 100 V can be employed as a power supply for charging. In this case, a voltage drop circuit and a commercially available power rectifier are also provided as the DC voltage transformer means, and a more effective charger can thus be obtained.

As for the output terminal portion of the present invention, positive and negative terminals are attached to a cover. Terminal position change means, for adjusting the terminal positions in consonance with the rechargeable battery, is so designed that one, or both, of the positive and negative terminals can slide and move, and the output terminal portion can be raised and lowered by flexible metal.

Instead of being integrally formed with the cover, the positive and negative terminals may be separately formed via lead lines at positive and negative poles. With this structure, the terminal position change means, and a polarity switching operation in consonance with the type of rechargeable battery are not required.

With the terminal position change means, the interval between the positive and negative terminals, and the height of the terminal from the face of the cover can be adjusted to cope with a variety of secondary batteries having different shapes and sizes. The means for changing the interval between the positive and negative terminals can be provided by

sliding at least one of the terminals along a line that connects the two terminals. A detailed adjustment of the heights of the terminals can be implemented by incorporating in the terminal attachment portion a flexible member, or by employing a flexible metal to form the terminals.

Further, according to the present invention, the charger for a secondary battery for a portable telephone comprises pressing means, for reducing contact resistance that occurs when the output terminal portion contacts the terminals of the rechargeable battery. The pressing means can be employed not only for an application wherein the positive and negative terminals are integrally attached to a cover, but also for an application wherein these terminals are individually provided.

The magnetic force of a permanent magnet can be used as the pressing means. A permanent magnet for attracting a flexible metal battery pack cover is attached to the output terminals. If a non-magnetic battery case is employed, a thin magnetic plate is bonded to a desired portion of a battery pack cover so that the permanent magnet can attract the thin magnetic plate.

The adhesive force of various viscous materials, such as a double-sided adhesive tape, or the compressive force of an elastic material, such as an

elastic belt, can be utilized as the pressing means. In this case, regardless of the material of which the battery pack is composed, the output terminal portion can be brought into contact with the rechargeable battery. In addition, the compressive force of an elastic belt with a fastener, or of a spring can be employed.

According to the present invention, a DC current jack is provided in parallel with the output terminal portion. By means of the DC current jack, power can be supplied to a connected portable telephone into which a secondary battery is loaded, and the secondary battery can be charged when it has a small load.

According to the present invention, the charger for a secondary battery for a portable telephone can charge the secondary battery using an easily available battery power source, so that while traveling or while on a business trip, or while away from home, the situation can be avoided where the phone malfunctions because the charge on a battery is exhausted.

In addition, when a 12 V circuit or a 24 V circuit is additionally provided, a car battery can be used for charging when a dry cell battery is not available.

The employment of the charger for a secondary battery of the present invention can prevent the malfunction of the phone because the charge on the battery is exhausted, and can almost always avoid the

situation where important communication can not be transmitted.

In the accompanying drawings:-

Fig. 1 is a block diagram illustrating the basic arrangement of a charger for a secondary battery for a portable telephone according to the present invention;

Fig. 2 is a block diagram illustrating a specific arrangement of the charger for a secondary battery for a portable telephone according to the present invention;

Fig. 3 is a perspective view of the general arrangement of the charger for a secondary battery for a portable telephone according to the present invention;

Fig. 4 is a perspective view of the structure of a cover, shown in Fig. 3, of the charger for a secondary battery for a portable telephone according to the present invention;

Fig. 5 is a side cross-sectional view of an example where the terminal of the charger is pressed against and contacts a battery according to one embodiment of the charger for a secondary battery for a portable telephone of the present invention;

Fig. 6 is a side cross-sectional view of another example where the terminal of the charger is pressed against and contacts a battery according to the embodiment of the charger for a secondary battery for a

portable telephone of the present invention;

Fig. 7 is a diagram illustrating the state of the connection of the charger for a secondary battery for a portable telephone according to the embodiment of the present invention;

Fig. 8 is a perspective view of another embodiment of the charger for a secondary battery for a portable telephone of the present invention where positive and negative output terminals are formed separately;

Fig. 9 is a partially cutaway side view of the structure of the terminal portion in the embodiment shown in Fig. 8;

Figs. 10A and 10B are side views of the contact state of a contact terminal in the embodiment in Figs. 8 and 9; and

Fig. 11 is a block diagram illustrating a charger for a secondary battery for a portable telephone according to an additional embodiment of the present invention.

The present invention relates to a charger, for a secondary battery for a portable telephone, that can easily charge the secondary battery, regardless of the time and place.

The preferred embodiments of the present invention will now be explained while referring to the accompanying drawings. It should be noted, however,

that the present invention is not limited to these embodiments.

Fig. 2 is a block diagram illustrating a circuit of a charger 10 for a secondary battery for a portable telephone according to the present invention. The same reference numerals as are used in Fig. 1 are also used in Fig. 2 to denote corresponding or identical components. The charger 10 comprises a connector 1 for a power source battery O, DC voltage transformer means 2, and an output terminal portion 3 relative to a rechargeable battery B.

The connector 1 for the power source battery O can be a connection portion for terminals that match the standards for dry cells or for a power source battery. The DC voltage transformer means 2 includes a voltage drop/boosting device 21, a switching device 22, a voltage drop/boosting controller 23, an inverted connection protector 24 and an inverted connection protection controller 25. The DC voltage transformer means 2 adjusts the voltage of the power source battery O, e.g., a voltage integral times the 1.5 V of a dry cell, or a voltage of a car battery, e.g., 12 V, relative to the rechargeable battery B.

Since the positions of the terminals for some rechargeable battery models B are inverted, when the battery B is invertedly loaded, the inverted connection protector 24 and the inverted connection protection

controller 25 prevent the flow of a reverse current to protect the circuit and to prevent the rechargeable battery B from being damaged.

In this case, at the same time the inverted connection protection controller 25 cuts the current to the circuit, it generates a visual or aural alarm to request that a user institute a switching operation. Further, in response to the output of the inverted connection protection controller 25, a polarity switch relay (not shown) is activated to perform automatic switching.

It is preferable that the output terminal portion 3, which contacts the rechargeable battery B, have a mechanism for coping with the sizes and the intervals of the terminals of various types of rechargeable batteries. For this adjustment, a terminal slide mechanism is provided to halt the output terminal portion at click positions that are consonant with a battery type, so that the output terminal portion can be adjusted precisely to correspond with the terminal positions of the rechargeable battery. In addition, the positive and negative terminals can be separately connected by a lead line. With this arrangement, the output terminal portion can be easily adjusted to conform with a plurality of rechargeable batteries of different types.

In addition, it is possible to arbitrarily employ,

as other modes, a method whereby attachments for individual battery types are prepared and are substituted as needed; a method whereby multiple machine screw holes for fixing terminals are formed and the terminals are selectively fixed at these holes by using a simple tool to adjust the output terminal portion so that its position corresponds with the terminal positions of the battery; or some other method.

With one of the above methods, the main body of a charger can be formed as a basic type, and can be adjusted at the convenience of a user to correspond to the type of battery in a user's machine. Further, when the battery type is changed in consonance with a change in a portable telephone model, the above charger, whose terminal positions can be altered, can continue to be used.

Fig. 3 is a perspective view of one preferred embodiment of the charger for a secondary battery for a portable telephone according to the present invention. As is shown in Fig. 3, the charger of the present invention comprises a main body 11, in which are provided a battery storage unit that incorporates the battery connector 1 and circuit devices (not shown) that serve as DC voltage transformer means; and a battery cover 12, in which is incorporated the output terminal portion 3 that includes the terminal position

change means. A polarity change switch 13 is provided for the main body 11. If the positive and negative connection terminals are formed separately, the polarity change switch 13 is not required. For a charging operation, the main body 11 is connected to the cover 12 by a connection cord (not shown).

Fig. 4 is a diagram showing the structure of the reverse side of the battery cover 12. A pair of positive and negative output terminals 3 are provided that are used for charging, and permanent magnets 14 are also provided as means for pressing a rechargeable battery against the terminals. The magnetic force of the permanent magnets 14 is employed to ensure an adequate contact pressure is exerted between the output terminals 3 and the terminals of the rechargeable battery. At this time, the permanent magnets 14 can be directly attached to the battery cover 12, if it is magnetic, or if the battery cover 12 is not magnetic, a thin magnetic plate can be bonded to the corresponding portion of the battery cover 12 by using double-sided adhesive tape or a good adhesive.

Figs. 5 and 6 are side cross-sectional views of the state where the charge terminals 3 of the battery cover 12 in Fig. 4 are pressed against and contact the terminals of the rechargeable battery B. In Fig. 5 is shown the pressing state where the terminals of the rechargeable battery B are positioned on the flat

surface of the battery B, and in Fig. 6 is shown the pressing state where the terminals of the rechargeable battery B is raised above the main body of the battery B. In order for the terminals 3 to appropriately contact the terminals of the rechargeable battery B, regardless of whether the terminals of the battery B are raised as is shown in Fig. 6 or are recessed in the main body, it is effective that the contact portions of the terminals 3 be formed of a flexible metal or be formed a flexible member that is incorporated at the terminal attached portion.

Fig. 7 is a plan view of the state where the positive and negative terminals are attached to the cover 12 in the embodiment shown in Fig. 3. The output terminal portion 3, which has a slide mechanism as the terminal position change means, is attached to the battery cover 12. For a charging process, the cover 12 is removed from the main body 11 and is connected thereto by an electric cord 15, and the voltage, which is adjusted to the terminal voltage of the rechargeable battery B, is applied to the terminal of the battery B. The interval of the output terminals 3 can relatively be adjusted, as is indicated by the solid line and the broken line. As a result, the output terminals 3 can cope with the charging of a plurality of secondary battery types of different sizes.

The means in Figs. 5 and 6 for using the permanent

magnet 14 to press the output terminals 3 against the terminals of the rechargeable battery B can be replaced by the employment of the holding force exerted by a viscous member, such as double-sided adhesive tape, an elastic belt, or a crimp fastener. When an elastic belt is used, an insertion hole for the elastic belt is formed in each contact unit 32, and the elasticity of the belt is employed to ensure proper contact pressure between the contact terminal 31 and the terminals of the rechargeable battery B. The elastic belt can be ring shaped and have a predetermined diameter, or it can be coupled together at its separate distal ends by a snap or by a crimp fastener.

As is described above, the permanent magnet for pressing the contact terminals 31 against the terminals of the rechargeable battery B can be replaced with pressing means composed of a combination of a viscous member, or a flexible member and a crimp fastener, and the holding force of the means can be employed to reduce the price and the weight of the charger.

Fig. 8 is a diagram showing the employment state according to another embodiment, where positive and negative output terminals for the rechargeable battery B are separately formed via lead lines. Positive and negative contact terminals 31 are formed of elastic metal, and are attached to the distal ends of the contact units 32, each of which includes a permanent

magnet. It is preferable for connection convenience that signs "+" and "-" be placed on the surface of the contact units 32 on the reverse side of the pressing means 14. The lead lines are connected to the rear ends of the contact units 32, and extend to the output terminals at the main body of the charger.

Fig. 9 is a partially cutaway side view of the structure of the output terminal portion where the positive and negative terminals are formed separately. The elastic metal contact terminal 31 is connected to the lead line in the contact unit 32, which is a so-called insert mold product obtained by insertion into a resin and molding. Under the contact unit 32, a permanent magnet 14 that serves as pressing means is attached, as in the previous embodiment, and can attract the cover of the rechargeable battery B.

Figs. 10A and 10B are diagrams for explaining how the flexibility of the flexible contact terminals 31 enables them to contact the rechargeable battery B, regardless of the peripheral structure of the terminals of the rechargeable battery B. When the terminal attachment position of the rechargeable battery B is as is shown in Fig. 10A or 10B, or when the terminal portion is raised, the contact terminals 31 can effectively contact the terminals of the rechargeable battery B. Therefore, it is convenient for the contact terminals 31 to be formed of a flexible metal or to

incorporate a flexible member at the attachment portion.

Table 1 shows the results obtained by examining the charging states when two AA alkali dry cell batteries were used in the circuit structure shown in Fig. 2 of the secondary battery charger according to the present invention. Examples of types of rechargeable batteries and the corresponding portable telephones in Table 1 are as follows:

Rechargeable battery 1: 3.6 V, 600 mAh (corresponding portable telephone example: NTT DoCoMo Mover P101 (800 MHz digital))

Rechargeable battery 2: 4.8 V, 550 mAh (corresponding portable telephone example: NTT DoCoMo Mover NII (800 MHz digital))

Rechargeable battery 3: 6 V, 550 mAh (corresponding portable telephone example: NTT DoCoMo Mover TZ820 (1.5 GHz digital))

[Table 1]

Relationship between required charging time and speech enabling time

Rechargeable battery	Charging mode	Charging time	Speech enabling time
1	rapid (30 min.)	30 min.	14 min.
	rapid (complete)	75 min.	34 min.
	normal (complete)	6 hours 16 min.	one hour 41 min.
2	rapid (30 min.)	32 min.	6 min. 30 sec.
	rapid (complete)	71 min.	14 min. 30 sec.
	normal (complete)	6 hours 24 min.	54 min.
3	rapid (30 min.)	30 min.	5 min. 30 sec.
	rapid (complete)	87 min.	12 min.
	normal (complete)	5 hours 06 min.	33 min. 30 sec.

In the above embodiment, the standard dry cell batteries, such as D, C and AA dry batteries, are employed, and as power source batteries their capacities are inadequate. A car mounted battery, therefore, can be used as the best available power source battery while traveling.

This condition can easily be achieved by providing a 12 V or 24 V voltage drop circuit in addition to the dry cell voltage drop/boosting circuit 21 in Fig. 2. The thus provided voltage drop circuit is connected to the charger by using a connection cord with a cigar lighter plug in the car, and activated to perform a charging process. The voltage from such a different power source battery can be adjusted to obtain a desired voltage for a rechargeable battery by using a switch (not shown) to alter the function of the voltage drop/boosting controller 23 in the block diagram in Fig. 2.

Fig. 11 is a block diagram illustrating a charger for a secondary battery for a portable telephone according to an additional embodiment of the present invention. In this embodiment, a DC jack 33 is provided for an output terminal portion 3 in addition to connection terminals relative to a rechargeable battery B. The DC jack 33 is used to apply a DC voltage that corresponds to a battery voltage to a portable telephone in which a secondary battery is

loaded. A jack is provided for the portable telephone and is connected in parallel to both terminals of the secondary battery. Plugs at both ends of a connection cord are inserted into the portable telephone jack and the DC jack 33 at the charger 10, so that the charger 10 is connected to the portable telephone.

According to the charger in this embodiment, even if the remaining capacity of the battery in the portable telephone is small, as the charger 10 is connected to the portable telephone, an external power source battery, such as a dry cell battery or a car battery, can be used to permit the portable telephone to function as it was originally intended. Thus, even when the remaining capacity of the secondary battery in the telephone is small, the transmission of speech over the phone is enabled. Further, in a low power consumption state, such as a waiting (standby) state, charging of the rechargeable battery can be performed.

In addition, the present invention can adopt a structure where charging using a commercially available power source can be performed by adding a well known rectifier.

According to the present invention, the charger for a secondary battery for a portable telephone can charge the secondary battery using an easily available power source battery. Thus, it is possible to avoid the occurrence of a malfunction where lack of battery

power prevents the transmission of speech over the phone while traveling, while on a business trip, or while away from home. Furthermore, if a 12 V circuit or a 24 V circuit is additionally provided, a car battery can be used for charging, even though a dry cell battery can not be obtained. In this case, this arrangement can easily cope with the terminal structure of a rechargeable battery, so that the charging can be performed regardless of the battery size, the rated voltage, and the polarity.

The employment of the secondary battery charger of the present invention can prevent the disabling of speech transmission due to a lack of battery power, and can eliminate malfunctions whereby important communications are disrupted, thereby enhancing the usability of a portable telephone.

With the arrangement where a DC jack is also provided, power is supplied to a portable telephone in which a rechargeable battery is loaded, and in addition, when the remaining capacity of the battery is small, it can be charged. Therefore, since even when only the remaining capacity of a battery is small, downtime of a portable telephone can be avoided by using an external battery, such as a dry cell battery, and charging can be performed while the telephone is not being used, the usability of the portable telephone is greatly improved.

Various modes of carrying out the invention are contemplated as being within the scope of the following claims particularly pointing out and distinctly claiming the subject matter regarded as the invention.

CLAIMS

1. A charger, for a secondary battery for a portable telephone, comprising:

a battery power connector, at which a voltage differs from a terminal voltage for a rechargeable battery that is used for a portable telephone;

DC voltage transformer means, for adjusting said voltage from a power supply battery to said voltage of said rechargeable battery; and

an output terminal portion, for applying a voltage output by said DC voltage transformer means to terminals of said rechargeable battery.

2. A charger for a secondary battery for a portable telephone according to claim 1, wherein said battery connector is a dry cell battery connector.

3. A charger for a secondary battery for a portable telephone according to claim 1, wherein said battery connector is a car battery output connector.

4. A charger for a secondary battery for a portable telephone according to claim 1, wherein said battery connector is an output connector of a commercially available power source rectifier.

5. A charger for a secondary battery for a portable telephone according to one of claims 1 through 4, wherein, as for said output terminal portion, said positive and said negative terminals are attached to a cover, and wherein terminal position change means, for

adjusting terminal positions in consonance with the rechargeable battery, is so designed that one, or both, of said positive and said negative terminals can slide and move, and said output terminal portion can be raised and lowered by flexible metal.

6. A charger for a secondary battery for a portable telephone according to one of claims 1 through 4, wherein said output terminal portion is separated to provide positive and negative poles via lead lines so that said positive and said negative poles are connected independently to said terminal positions of said rechargeable battery.

7. A charger for a secondary battery for a portable telephone according to one of claims 1 through 6, further comprising pressing means, for reducing contact resistance that occurs when said output terminal portion contacts said terminals of said rechargeable battery.

8. A charger for a secondary battery for a portable telephone according to claim 7, wherein said pressing means is a permanent magnet that is provided for said output terminal portion to directly or indirectly attract an external surface of a case of said rechargeable battery.

9. A charger for a secondary battery for a portable telephone according to claim 7, wherein said pressing means is a viscous member that is attached to

an external surface of said rechargeable battery and/or to said output terminal portion.

10. A charger for a secondary battery for a portable telephone according to claim 7, wherein said pressing means is an elastic belt that is provided for an external surface of said rechargeable battery and/or for said output terminal portion.

11. A charger for a secondary battery for a portable telephone according to one of claims 1 through 7, wherein a DC current jack is provided in parallel with said output terminal portion, and wherein by means of said DC current jack, power can be supplied to a connected portable telephone into which a secondary battery is loaded, and said secondary battery can be charged when having a small load.

Patent Office

27

Application No:	GB 9708282.0	**Examiner:**	M J Billing
Claims searched:	1 to 11	**Date of search:**	3 July 1997

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Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.O): H2H HBCD, HBCE, HBCF, HBCG, HBCH; H4L LECTX.

Int Cl (Ed.6): H01M 10/46; H02J 7/00, 7/02; H04B 1/38; H04M 1/72; H04Q 7/32.

Other:

Documents considered to be relevant:

Category	Identity of document and relevant passage		Relevant to claims
X	GB2285187A	(NOKIA) - Figs.3,5; Abstract	1,3 at least
X	GB2282716A	(E LEAD)- Fig.1; Abstract	1,4,5 at least
X	GB2275582A	(E LEAD) - Fig.2; Abstract	1,4,5-8,10 at least
X	GB2249677A	(MITSUBISHI) - Fig.1; Abstract	1,3 at least
X	GB1470685	(MABUCHI) - Figs.1-3, 8-10	1,2,4,7 at least
X	EP0470060A1	(ERICSSON) - Figs.1,2; Abstract	1,3 at least
X	WO96/21900A1	(INTEL) - Fig.1; Abstract	1,2,4,11 at least
X	US5343136	(TOSHIBA) - Figs.1-3; Abstract	1,2,4 at least
X	US5280229	(BSG-SCHALTTECHNIK) - Fig.1; Abstract	1,4 at least

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